

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

- 1 1. (original) A method that analyzes mass spectra using a digital computer, the method
2 comprising:
 - 3 a) entering into a digital computer a data set obtained from mass spectra
4 from a plurality of samples, wherein each sample is, or is to be assigned to a class within a
5 class set comprising two or more classes, each class characterized by a different biological
6 status, and wherein each mass spectrum comprises data representing signal strength as a
7 function of time-of-flight, mass-to-charge ratio, or a value derived from time-of-flight or
8 mass-to-charge ratio; and
 - 9 b) forming a classification model which discriminates between the
10 classes in the class set, wherein forming comprises analyzing the data set by executing code
11 that embodies a classification process comprising a recursive partitioning process.
- 1 2. (original) The method of claim 1 wherein the mass spectra are selected from the
2 group consisting of MALDI spectra, surface enhanced laser desorption/ionization spectra,
3 and electrospray ionization spectra.
- 1 3. (original) The method of claim 1 wherein the class set consists of exactly two
2 classes.
- 1 4. (original) The method of claim 1 wherein the samples comprise biomolecules
2 selected from the group consisting of polypeptides and nucleic acids.
- 1 5. (original) The method of claim 1 wherein the samples are derived from a eukaryote,
2 a prokaryote or a virus.

- 1 6. (original) The method of claim 1 wherein the different biological statuses comprise a
2 normal status and a pathological status.
- 1 7. (original) The method of claim 1 where the different biological statuses comprise
2 un-diseased, low grade cancer and high grade cancer.
- 1 8. (original) The method of claim 1 wherein the different biological statuses comprise a
2 drug treated state and a non-drug treated state.
- 1 9. (original) The method of claim 1 wherein the different biological statuses comprise a
2 drug-responder state and a drug-non-responder state.
- 1 10. (original) The method of claim 1 wherein the different biological statuses comprise a
2 toxic state and a non-toxic state.
- 1 11. (original) The method of claim 10 wherein the toxic state results from exposure to a
2 drug.
- 1 12. (original) The method of claim 1 wherein the data set is a known data set, and each
2 sample is assigned to one of the classes before the data set is entered into the digital
3 computer.
- 1 13. (original) The method of claim 1 wherein forming the classification model comprises
2 using pre-existing marker data to form the classification model.

- 1 14. (original) The method of claim 1 wherein the data set is formed by:
2 detecting signals in the mass spectra, each mass spectrum comprising data
3 representing signal strength as a function of mass-to-charge ratio;
4 clustering the signals having similar mass-to-charge ratios into signal clusters;
5 selecting signal clusters having at least a predetermined number of signals
6 with signal intensities above a predetermined value;
7 identifying the mass-to-charge ratios corresponding to the selected signal
8 clusters; and
9 forming the data set using signal intensities at the identified mass-to-charge
10 ratios.
- 11 15. (original) The method of claim 1 wherein forming the classification model comprises
12 at least one of identifying features that discriminate between the different biological statuses,
13 and learning.
- 1 16. (original) The method of claim 1 wherein the classification process is a binary
2 recursive partitioning process
- 1 17. (original) The method of claim 1 further comprising:
2 c) interrogating the classification model to determine if one or more
3 features discriminate between the different biological statuses.
- 1 18. (original) The method of claim 1 further comprising:
2 c) repeating a) and b) using a larger plurality of samples.
- 1 19. (original) The method of claim 1 wherein the classification process is a classification
2 and regression tree process.

1 20. (original) The method of claim 1 further comprising forming the data set, wherein
2 forming the data set comprises obtaining raw data from the mass spectra and then
3 preprocessing the raw mass spectra data to form the data set.

1 21. (original) The method of claim 1 wherein the different classes are selected from
2 exposure to a drug, exposure to one of a class of drugs and lack of exposure to a drug or one
3 of a class of drugs.

1 22. (original) The method of claim 1 wherein the each mass spectrum comprises data
2 representing signal strength as a function mass-to-charge ratio or a value derived from mass-
3 to-charge ratio.

1 23. (original) A method for classifying an unknown sample into a class characterized by
2 a biological status using a digital computer, the method comprising:
3 a) entering data obtained from a mass spectrum of the unknown sample
4 into a digital computer; and
5 b) processing the mass spectrum data using the classification model
6 formed by the method of claim 1 to classify the unknown sample in a class characterized by a
7 biological status.

1 23. (canceled) (second occurrence)

1 24. (original) The method of claim 23 wherein the different biological statuses comprise
2 un-diseased, low grade cancer and high grade cancer.

1 25. (original) The method of claim 23 wherein the class is characterized by exposure to a
2 drug of one of a class of drugs.

1 26. (original) The method of claim 23 wherein the class is characterized by response to a
2 drug.

1 27. (original) The method of claim 23 wherein the class is characterized by a toxicity
2 status.

1 28. (original) A method for estimating the likelihood that an unknown sample is
2 accurately classified as belonging to a class characterized by a biological status using a
3 digital computer, the method comprising:
4 a) entering data obtained from a mass spectrum of the unknown sample
5 into a digital computer; and
6 b) processing the mass spectrum data using the classification model
7 formed by the method of claim 1 to estimate the likelihood that the unknown sample is
8 accurately classified into a class characterized by a biological status.

1 29. (original) A computer readable medium comprising:
2 a) code for entering data obtained from a mass spectrum of an unknown
3 sample into a digital computer; and
4 b) code for processing the mass spectrum data using the classification
5 model formed by the method of claim 1 to classify the unknown sample in a class
6 characterized by a biological status.

1 30. (original) A system comprising:
2 a gas phase ion spectrometer;
3 a digital computer adapted to process data from the gas phase ion
4 spectrometer; and
5 the computer readable medium of claim 29 in operative association with the
6 digital computer.

1 31. (original) The system of claim 30 wherein the gas phase ion spectrometer is adapted
2 to perform a laser desorption ionization process.

1 32. (original) A computer readable medium comprising:
2 a) code for entering data obtained from a mass spectrum of an unknown
3 sample into a digital computer; and
4 b) code for processing the mass spectrum data using the classification
5 model formed by the method of claim 1 to estimate the likelihood that the unknown sample is
6 accurately classified into a class characterized by a biological status.

1 33. (original) A system comprising:
2 a gas phase ion spectrometer;
3 a digital computer adapted to process data from the gas phase ion
4 spectrometer; and
5 the computer readable medium of claim 32 in operative association with the
6 digital computer.

1 34. (original) The system of claim 33 wherein the gas phase ion spectrometer is adapted
2 to perform a laser desorption ionization process.

1 35. (original) A computer readable medium comprising:
2 a) code for entering data derived from mass spectra from a plurality of
3 samples, wherein each sample is, or is to be assigned to a class within a class set of two or
4 more classes, each class characterized by a different biological status, and wherein each mass
5 spectrum comprises data representing signal strength as a function of time-of-flight, mass-to-
6 charge ratio or a value derived from mass-to-charge ratio or time-of-flight; and
7 b) code for forming a classification model using a classification process,
8 the classification process comprising a recursive partitioning process, wherein the
9 classification model discriminates between the classes in the class set.

1 36. (original) The computer readable medium of claim 35 wherein the classification
2 process is a classification and regression tree process.

1 37. (original) A system comprising:
2 a gas phase ion spectrometer;
3 a digital computer adapted to process data from the gas phase ion
4 spectrometer; and
5 the computer readable medium of claim 35 in operative association with the
6 digital computer.

1 38. (original) The system of claim 37 wherein the gas phase ion spectrometer is adapted
2 to perform a laser desorption ionization process.